THE CLAIMS

1. A method of forming a mesoscopically structured material having a dynamic change in refractive index comprising the steps of:

combining an amphiphilic block copolymer that functions as a structure-directing agent with an inorganic compound of a multivalent metal species whereby the block copolymer and inorganic compound are self-assembled and the inorganic compound is polymerized to form a mesoscopically structured inorganic-organic composite; and

at least partially filling the resulting mesoscopically structured inorganic-organic composite with a material having a dipole moment that is variable responsive to a predetermined stimulus.

2. The method according to claim 1 wherein the material having a variable refractive index is responsive to a stimulus comprising an optical field.

3. The method according to claim 1 wherein the material having a variable refractive index is responsive to a stimulus comprising an electric field.

4. The method according to claim 1 wherein the material having a variable refractive index is responsive to a stimulus comprising a thermal field.

5. The method according to claim 1 wherein the material having a variable dipole moment is selected from the group consisting of conjugated organic molecules, polycyclic aromatics, and azobenzenes.

6. The method according to claim 1 wherein the material having variable dipole moment comprises an organic dye.

7. The method according to claim 6 wherein the organic dye comprises a material selected from the group consisting of spiropyrans and spirooxazines.

8. The method according to claim 1 wherein the material having a variable dipole moment comprises a photocrome.

9. The method according to claim 1 wherein the material having a variable dipole moment comprises a photochromic surfactant.

10. The method according to claim 1 wherein the material having a variable dipole moment comprises a multi-photon absorbing chromophore.

11. The method according to claim 1 wherein the material having a variable dipole moment comprises a near-infrared chromophore selected from the group consisting of cyanines, polyenes, annulenes, and porphyrins.

12. The method according to claim 1 wherein the material having a variable dipole moment comprises a π-conjugated near-infrared dye.

13. The method according to claim 1 wherein the material having a variable dipole moment comprises a donor-acceptor polyene selected from the group consisting of meropolymethines and charged polymethines.

14. The method according to claim 1 wherein the material having a variable dipole moment comprises a zwitterionic N-pyridinium phenolate.

15. A method of forming a lens having a variable refractive index comprising the steps of:

combining an amphiphilic block copolymer that functions as a structure-directing agent with an inorganic compound of a multivalent metal species whereby the block copolymer and inorganic compound are self-assembled and the inorganic compound is polymerized to form a mesoscopically structured inorganic-organic composite;

at least partially filling the resulting mesoscopically structured inorganic-organic composite with a material having a dipole moment that is variable responsive to a predetermined stimulus; and

forming the mesoscopically structured inorganic-organic composite having the stimulus responsive variable refractive index material therein into a lens.

16. The method according to claim 15 wherein the material having a variable refractive index is responsive to a stimulus comprising an optical field.

17. The method according to claim 15 wherein the material having a variable refractive index is responsive to a stimulus comprising an electric field.

18. The method according to claim 15 wherein the material having a variable refractive index is responsive to a stimulus comprising a thermal field.

19. The method according to claim 15 wherein the material having a variable dipole moment is selected from the group consisting of conjugated organic molecules, polycyclic aromatics, and azobenzenes.

20. The method according to claim 15 wherein the material having variable dipole moment comprises an organic dye.

21. The method according to claim 20 wherein the organic dye comprises a material selected from the group consisting of spiropyrans and spirooxazines.

22. The method according to claim 15 wherein the material having a variable dipole moment comprises a photocrome.

23. The method according to claim 15 wherein the material having a variable dipole moment comprises a photochromic surfactant.

24. The method according to claim 15 wherein the material having a variable dipole moment comprises a multi-photon absorbing chromophore.

25. The method according to claim 15 wherein the material having a variable dipole moment comprises a near-infrared chromophore selected from the group consisting of cyanines, polyenes, annulenes, and porphyrins.

26. The method according to claim 15 wherein the material having a variable dipole moment comprises a π-conjugated near-infrared dye.

27. The method according to claim 15 wherein the material having a variable dipole moment comprises a donor-acceptor polyene selected from the group consisting of meropolymethines and charged polymethines.

28. The method according to claim 15 wherein the material having a variable dipole moment comprises a zwitterionic N-pyridinium phenolate.

29. A method of forming a mesoscopically structured material having a dynamic change in refractive index comprising the steps of:

combining an amphiphilic block copolymer that functions as a structure-directing agent with an inorganic compound of a multivalent metal species whereby the block copolymer and inorganic compound are self-assembled and the inorganic compound is polymerized to form a mesoscopically structured inorganic-organic film; and

at least partially filling the resulting mesoscopically structured inorganic-organic composite with a material having a dipole moment that is variable responsive to a predetermined stimulus.

30. The method according to claim 29 wherein the material having a variable refractive index is responsive to a stimulus comprising an optical field.

31. The method according to claim 29 wherein the material having a variable refractive index is responsive to a stimulus comprising an electric field.

32. The method according to claim 29 wherein the material having a variable refractive index is responsive to a stimulus comprising a thermal field.

33. The method according to claim 29 wherein the material having a variable dipole moment is selected from the group consisting of conjugated organic molecules, polycyclic aromatics, and azobenzenes.

34. The method according to claim 29 wherein the material having variable dipole moment comprises an organic dye.

35. The method according to claim 34 wherein the organic dye comprises a material selected from the group consisting of spiropyrans and spirooxazines.

36. The method according to claim 29 wherein the material having a variable dipole moment comprises a photo crome.

37. The method according to claim 29 wherein the material having a variable dipole moment comprises a photochromic surfactant.

38. The method according to claim 29 wherein the material having a variable dipole moment comprises a multi-photon absorbing chromophore.

39. The method according to claim 29 wherein the material having a variable dipole moment comprises a near-infrared chromophore selected from the group consisting of cyanines, polyenes, annulenes, and porphyrins.

40. The method according to claim 29 wherein the material having a variable dipole moment comprises a π-conjugated near-infrared dye.

41. The method according to claim 29 wherein the material having a variable dipole moment comprises a donor-acceptor polyene selected from the group consisting of meropolymethines and charged polymethines.

42. The method according to claim 29 wherein the material having a variable dipole moment comprises a zwitterionic N-pyridinium phenolate.

43. A method of forming a mesoscopically structured material having a dynamic change in refractive index comprising the steps of:

combining an amphiphilic block copolymer that functions as a structure-directing agent with an inorganic compound of a multivalent metal species whereby the block copolymer and inorganic compound are self-assembled and the inorganic compound is polymerized to form a mesoscopically structured inorganic-organic fiber; and

at least partially filling the resulting mesoscopically structured inorganic-organic composite with a material having a dipole moment that is variable responsive to a predetermined stimulus.

44. The method according to claim 43 wherein the material having a variable refractive index is responsive to a stimulus comprising an optical field.

45. The method according to claim 43 wherein the material having a variable refractive index is responsive to a stimulus comprising an electric field.

46. The method according to claim 43 wherein the material having a variable refractive index is responsive to a stimulus comprising a thermal field.

47. The method according to claim 43 wherein the material having a variable dipole moment is selected from the group consisting of conjugated organic molecules, polycyclic aromatics, and azobenzenes.

48. The method according to claim 43 wherein the material having variable dipole moment comprises an organic dye.

49. The method according to claim 48 wherein the organic dye comprises a material selected from the group consisting of spiropyrans and spirooxazines.

50. The method according to claim 43 wherein the material having a variable dipole moment comprises a photo crome.

51. The method according to claim 43 wherein the material having a variable dipole moment comprises a photochromic surfactant.

52. The method according to claim 43 wherein the material having a variable dipole moment comprises a multi-photon absorbing chromophore.

53. The method according to claim 43 wherein the material having a variable dipole moment comprises a near-infrared chromophore selected from the group consisting of cyanines, polyenes, annulenes, and porphyrins.

54. The method according to claim 43 wherein the material having a variable dipole moment comprises a π-conjugated near-infrared dye.

55. The method according to claim 43 wherein the material having a variable dipole moment comprises a donor-acceptor polyene selected from the group consisting of meropolymethines and charged polymethines.

56. The method according to claim 43 wherein the material having a variable dipole moment comprises a zwitterionic N-pyridinium phenolate.